FINANCIAL PORTFOLIO RISK MANAGEMENT

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RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. application number 09/431,390 entitled "SYSTEM, METHOD AND ARTICLE OF MANUFACTURE FOR A FINANCIAL RISK MODELING SUBSYSTEM" filed November 1, 1999, and U.S. application number 09/520,580 entitled "SYSTEM, METHOD AND ARTICLE OF MANUFACTURE FOR PERFORMING A RISK ANALYSIS USING A NETWORK-BASED PERSONAL INVESTMENT MANAGER" filed May 25, 2000 both of which we incorporated herein by reference.

FIELD OF INVENTION

The present invention relates generally to computerized information systems and more particularly to computer implemented financial modeling systems.

BACKGROUND OF THE INVENTION

In today's economic environment, increasing number of individuals are supplementing their retirement plans with personal investment portfolios. Rather than investing in mutual funds, everyday greater numbers of individuals are opting for individually managed portfolios. Until recently, this option was only available to the very wealthy. However, smaller investors are becoming aware of the benefits of an individually managed stock portfolio.

These small investors are increasingly relying upon computer-based systems that organize their financial assets and liabilities and further provide them with a summary of their financial health. However, these systems tend to focus on the administrative aspects of financial planning without enabling the user to make reasoned choices about their financial futures. Furthermore, these systems are limited by their inability to dynamically analyze the financial goals. These limitations are counterproductive to the user's needs to develop and manage an integrated personal financial plan from an executive decision-making perspective.

Many existing financial management systems allow users to electronically organize their financial assets and liabilities. These systems typically focus on presenting the user with a transactional summary of their financial health. Furthermore, these systems typically rely on the user to continually update their personal financial data. As a result, these systems are merely data-driven calculators that are incapable of providing

the user with meaningful financial advice tailored to their financial intentions and expectations.

Another problem with many existing financial management systems is that the user is typically limited to managing the transactional details of their financial data. In these systems the user is shielded from the planning and deciding aspects of developing their financial plan. Accordingly, the user learns very little from the process and remains heavily dependent on the system to provide an accurate summary of their financial health. These limitations further exacerbate the lack of trust inherent within the relationship between the user and the financial management system.

Furthermore, many existing financial management systems merely project a future value of the user's financial portfolio without providing an indication of the likelihood of achieving that value. Thus, the user is left without any real sense of how to compare one financial plan to another. Consequently, these systems fail to foster a deeper understanding of the risks and/or rewards associated with reasoned financial planning.

Also, few investors have a real understanding of some basic investment parameters such as their risk tolerance, investment style market preferences. These personal financial parameters are what financial advisors would use to help an individual investor devise an investment strategy. Most of the current automated financial management tools are unable to help a user tailor a personal investment strategy.

Furthermore, none of the current financial modeling tools available to the smaller investor can model an existing investment portfolio and help the user move toward an ideal portfolio that would better match the user's investment style, risk tolerance, etc. Also, none of the current portfolio modeling tools available to the average investor have the capability of recommending individual securities based on the user's personal financial parameters and preferences. Since most average investors are not able to interpret the results of these sophisticated algorithms, automated context sensitive coaching is another essential ingredient necessary to enable the user to assume an executive decision making role in his personal financial affairs.

No system currently exists that brings into a personal financial modeling tool, professional level industry accepted algorithms and modeling techniques to forecast the future performance of an investment model, and allow the user to analyze his or her financial portfolio using these techniques, and take advantage of automated and live coaching along the way.

SUMMARY OF THE INVENTION

In general terms, the present invention relates to a financial management system for modeling the risk associated with the investment portfolio of a user. The system

operates in a collaborative computing environment between the user and a financial advisor and comprises a service level subsystem and an advice generating subsystem. The service level subsystem allows the user to negotiate a service level agreement that defines the user's desired level of support and limits access to user provided information. The advice generating subsystem is coupled to the service level subsystem and includes one or more advice engines that dynamically analyze the financial needs of the user in accordance with the user's service level agreement. Furthermore, the advice engine provides customized financial advice tailored to the user's life intentions.

In a preferred embodiment of the present invention, after the user and the financial modeling system have negotiated a service level suitable for the user and profitable for the financial institution, the user has access to a variety of financial tools including the risk modeling tool, based on the service level agreement.

In one embodiment of the present invention, the system includes a portfolio modeling system, wherein information from various sources including external sources, and from the user inputs are combined and modeled into the user's current and historical financial portfolio. Furthermore, a financial portfolio risk management system creates a user personal investment profile based on a series of interactive exercises wherein the user is guided through a various scenarios generated by the system and the user responses are evaluated in terms of user risk tolerance, user investment style and user's bull/bear attitude toward the market.

Once the user's personal investment parameters have been determined, the system may generate an ideal portfolio based on the user's personal investment profile. Securities may be filtered through various filters reflecting the user's market attitude, investment style and risk tolerance and securities may be suggested to better mold the user's portfolio to his investment profile. The effect of swapping each security in and out of the user' s portfolio is reflected in the model.

Also, the user's present portfolio may be compared to various market indices in terms of risk and return, and the result is graphed on a risk/reward map. The system compares the user's portfolio Value At Risk to that of some user selected benchmark indexes and/or securities. The user portfolio's volatility or Beta value can be compared to that of chosen benchmark Beta values.

In an alternative other embodiment of the present invention, by various algorithms, the system may project the user's portfolio value into the future and predict the possibility of the user achieving his investment target, as well as the probabilities of doing better and worse than the user minimum goal.

The present invention allows the user to access an automated rule-based coaching system directing the user through all transactions within the system, focusing his attention to possible financial problems and suggesting possible general solutions. Furthermore, having received automated coaching, the user may further have access to a

live advisor in order to receive more specific financial advice. The access to the automated coaching and the live advisor may be controlled in part by a service level agreement.

The present invention's financial risk modeling system is a dynamic, interactive and intelligent risk modeling tool that incorporates a user profiles as a parameter of the financial risk model. Thus the system can model the user's existing and historical financial portfolio, and further make appropriate user specific recommendation to help the user achieve his financial goals, by filtering and presenting to the user only securities that conform to the user's personal investment parameters. The present invention helps investors to objectively quantify the risk and reward in their personal portfolios. It supports investors in making optimal picks to meet their investment goals and avoid unaffordable losses. These and other advantages of the present invention will be apparent upon a study of the following descriptions and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, aspects and advantages are better understood form the following detailed description of a preferred embodiment of the invention with reference to the drawings, in which:

Figure 1 illustrates a representative system architecture in accordance with a preferred embodiment;

Figure 2 is a block diagram of a financial management system;

Figure 3 is a block diagram of a representative hardware environment in accordance with a preferred embodiment;

Figure 4 is a block diagram of a financial management system;

Figure 5 is an illustration of a investment portfolio generator web page interface;

Figure 6 is a flow diagram of an operation of the Investment Portfolio generator in accordance with a preferred embodiment;

Figure 7 is a flow diagram of how to set risk tolerance;

Figure 8 is a flow diagram of how to set investment style;

Figure 9 is a flow diagram of how to set Bull/Bear attitude operation in greater detail;

Figure 10 is a flow diagram of how to model an existing portfolio;

Figure 11 is a flow diagram of how to build a computer generated portfolio;

Figure 12 is a flow diagram of how to rebalance a portfolio;

Figure 13 is a flow diagram of portfolio analysis steps;

Figure 14 is an illustration of a risk target graph web page interface;

Figure 15 is an illustration of a risk exposure up to the present graph web page interface;

Figure 16 is an illustration of a portfolio future performance projection graph web page interface;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure **1** is an illustration of one embodiment of a financial management information system for providing personalized financial advice in a collaborative computing environment between a user and a dedicated financial advisor. Referring to Figure **1**, financial management system **100** comprises a financial advisor system **102** connected through a wide area network **104** to the live advisor terminal **106** a user terminal **110**. The financial advisor system **102** further includes a risk modeling system **107** that performs various risk modeling operations on the user investment portfolio. Preferably, the wide area network **104** is a global network such as the Internet. The Internet is based on the TCP/IP communication protocol first developed by the Department Of Defense in the 1960s. However, the present invention is not limited to the Internet and the TCP/IP protocol. The present invention can be implemented using any other protocols and any other networking system, including wireless networks, the Network File Service (NFS) protocol used by Sun Microsystems or a Novel network based on the UDP/IPX protocol.

Preferably, the user may access the system through any type of a wide area network using a any user terminal **110**. A typical user computer terminal would be described in more detail in figure **3.**

The user (e.g. individuals or company representative seeking financial advice) may access the system using a user terminal **110** (e.g. personal computer). A typical user computer terminal would be described in more detail in figure **3.** The user terminal **110** is

equipped with a proper interface to receive live streaming video or still pictures from the advisor video camera **108-B** sent over the wide area network **104** to the user **110**. Preferably, the user terminal **110** is further equipped with a video camera **108-A** and software to transmit live streaming video from the user, across the network **104** to the live advisor at the advisor terminal **106**.

Access to the live financial advisor **106** and all other services provided by the Financial management system is controlled and channeled through the Financial Advisor system **102**. The user can access the financial advisor system **102** through the network **104** or by telephone **109-A**. A user telephone call is channeled through a call center discussed further in Figure **2** to the Financial Advisor System and to the live advisor **106**.

Preferably, the user may communicate with the financial advisor system **102** through any number of devices such as a handheld wireless personal organizer, pagers, cellular telephones, land telephones and regular desktop computers. All of the above equipment can act as a user terminal **110**.

The live advisor terminal **106** is preferably equipped with the video camera **108-B** for transmitting live streaming video. The live advisor **106** may further communicate with the user via a telephone **109-B**.

Figure **2** is a block diagram of an implementation of the financial advisor system **102.** The user may access the system through the wide area network **104** and through a

firewall server **112**. In a preferable implementation of the present invention, the wide area network is the Internet, intranet, etc. A Web server **114** provides the user with a personalized website providing an interactive interface between the user, the financial advisor and financial management system **100**. The financial advisor system **102** further includes of a mail server **116**, an application server **126**, a call center **117** and a data server **128**, all interconnected through a local area network **106**. The local area network (LAN) **113** may be any wide area intranet system or the Internet.

Security is important in any financial system. The firewall server **112** controls the access to the financial advisor system. The purpose and functionality of a firewall server is to prevent access to the system by unauthorized users and it would be appreciated by one skilled in the arts. Firewall servers are available through a variety of vendors and have become a standard feature of any secure system used as the primary defense against intruders and hackers.

The web server **114** provides a personalized interactive web page environment for the user to operate in once he accesses the system. The web page is acting as the web interface between the financial system Web pages may be created using the Hyper Text Markup Language (HTML), scripting languages such as Java Script™ or Pearl™ as well as Java™ applets. Creation of customized web page using any of the above programming languages is well within the scope of one skilled in the arts. The personalized web page provides an environment and an interface for the user to interact with the financial advisor system **102**. As an example, in one embodiment of the present

invention, by selecting an appropriate icon from the interactive personalized website, the user is able to learn, plan, decide, transact and monitor his financial model. The mail server **116** handles electronic mail communication between the user and the financial advisor system **102**. The Mail server **116** may operate using any standard protocol such as Simple Mail Transfer Protocol (SMTP) and it is within the scope of the knowledge of one skilled in the art.

The application server **126** is where the various modules of the financial advising system reside. The modules include the various coaching engines, the LifePath and the portfolio modeling sub-systems. The applications may be implemented in any programming language, including the object oriented programming languages such as C++ or Java™ and be based on any platform such as UNIX™, Apple OS ™ or Windows™ and NT™.

Alternatively, the user may also interact with financial advisor system **102** using a telephone **124**. The user's call is channeled through the call center system **117**. The call center **117** includes an Automatic Call Distributor (ACD) server **122**, an Interactive Voice Response Server (IVR) **124**, a Computer Telephony Integration (CTI) server **118** and a Relationship Manager (RM) workstation **125**, all interconnected through the Local Area Network or intranet **127**. The local area network **113** may also be used in interconnecting the various servers of call center. When the user calls into the financial advising system **102** using a remote telephone **124**, the IVR sever **124** receives the user's telephone call. The IVR system greets callers, prompting them for identification, and

providing some information automatically. The Automatic Call Distributor (ACD) server **122** distributes the call using the Internet Protocol (IP) over the network, to the appropriate live coach. The Computer Telephony integration server (CTI) **118** acts as the link between the live advisor's telephone call and the workstation based applications and allows them to automatically work together. As an example, when the IVR server **120** obtains some information about the calling user, this information is delivered to the live advisor's workstation **106**, so the advisor does not have to request the same information again. Once the telephone call is properly routed to the live advisor, the user can user other means of communication such as electronic mail or white board ™ simultaneously while he is interacting with the live advisor.

The Data server **128** stores user input data and supplies the application Server **126**. The data server **128** includes outside database sources from which the financial advising system **102** can draw information such as actuarial data such as historical price data on securities from sources such as Reuters, user financial information such as banking and portfolio information in other financial institution, and market information such as the days closing numbers for various market indices as well as individual stock securities pricing information. Formatted in the Open File Exchange (OFX) format, now the accepted internet standard used by programs such as Quicken™ and MS Money ™ the data server through the firewall can easily exchange information with the outside world and specifically the user. Furthermore, the coaching engine rules for various coaching engine may reside on the application server **126**.

It should be noted that various computing platforms could be used to access the financial management system of the present invention. For example, a networked personal computer environment, a client-server system, a mainframe terminal environment, WEB TV terminal environment, dumb terminal environments can be used to access the financial management system of present invention. Depending upon the user's needs, a client-server system may be the most preferable computing system for implementing the financial system of the present invention. Furthermore, the representation of each server such as an application server or a data server is a logical representation. The actual physical systems may be distributed over many servers, or be included on a single machine.

Figure **3** is a computer system architecture that can be used in implementing the present invention. This computer system architecture can be used to implement a user workstation, or any of the servers called for in figure **2**. The present invention may be practiced on any of the personal computer platforms available in the market such as an IBM™ compatible personal computer, an Apple Macintosh™ computer or UNIX™ based workstation. The operating system environment necessary to practice the present invention can be based on Windows™, NT™, UNIX™, Apple Operating System™, or free operating system software such as Linux™ and Apache™. Furthermore, the computer system can support a number of processes. As appreciated by one skilled in the art, the processes may be written in any of the available programming languages including the newer object oriented programming languages such as Java ™ or C++.

The computer system architecture of figure **3** comprises of a central processing unit **130**, such as a microprocessor, a read only memory (ROM) **136**, a random access memory (ROM) **134**, an input and output adapter **138**, a storage device **140**, and interface **142** connecting a plurality of input and output device such as a keyboard **144**, a mouse **146**, a speaker **148**, a microphone **150**, a video camera **152** and a display **158**, and a system bus interconnecting all the components together. The computer may also include such devices as a touch screen (not shown) connected to the bus **132** and communication adapter **154** such as a dial up modem, a Digital Subscriber Line (DSL) modem or a cable modem, for connecting the workstation to a communication network **104** (e.g., the internet). The storage device **140** can be any number of devices including but not limited to hard disk drive, a floppy drive, CD-ROM, DVD, a tape device, or the newer removable storage devices such as a Jazz™ drive or ZIP™ drive.

Figure **4** represents a block diagram of a financial Modeling System **102** of the present invention. A user would connect to the Financial Advisor system **102** using the wide area network **104**. Once connected, the user has to input his login information and be authenticated by the firewall server. The user at a user terminal **110** enters the Financial Advisor system **102** at the service level subsystem **160**. The service level agreement provides the level of services the user is entitled to. Once the user has negotiated a service level agreement **161**, he is prompted to select the model to be used in operation **162**. In one embodiment of the present invention, the level of service and support selected in the service level agreement **160** would control the user's access to different modeling tools.

In a preferred embodiment of the present invention the Lifepath model may be the hub of the financial institution's relationship. The LifePath model provides data to all coaching engine allowing customized coaching output to be dispensed to the user based on his unique financial situation. The Lifepath model combines all the pertinent financial information about a user in one coherent and comprehensive picture and models the user's life intentions into an aggregated cash flow system over a user selected period of time. Using the terminal **110 the** user inputs his life intentions in terms of projected income and expenses. The Lifepath model **164** maintains an interactive dialog between the user and financial management system **100**. The Lifepath model integrates the financial information available about the user in accordance with the user's service level agreement **160** to create an aggregate forecast of cash flow over the user's lifetime. The financial information available about the user includes the user's life intentions data **166** and the user's external financial data **168**. In a preferred embodiment of the present invention, the user's external financial data can include current checking account information from the user's bank or data related the user's 401K plan. By incorporating external data **168** into the Lifepath model **164**, the system is capable of dynamically analyzing the financial needs of the user and providing the user with an understanding of their financial health at any point with minimal input form the user. As discussed above, personalized service level agreement **160** can optionally allow the user to limit the system's and/or advisor's access to the user's external financial data **168**.

Additionally, life path model **164** also integrates external market data **170** into the aggregated forecast of the user's cash flow. In one embodiment of the present invention, external market data **170** includes information such as current mortgage interest rates or market inflation rates. Access to both internal and external databases is controlled by the user's service level agreement.

The LifePath modeling tool **164** is further discussed in a related U.S. application named the A Financial Planning and Counseling System Projecting User Cash Flow, by the same inventors as the present invention, attorney docket number AND1P758, filed on the same day as the present application and incorporated herein by reference. Furthermore, the communication system described in figure **2** is further described in the related application titled Communication Interface For a Financial Modeling and Counseling System, attorney docket number AND1P757, by the same inventors as the present invention, filed on the same day as the present invention, and herein incorporated by reference. The automated coaching and live advising systems are further described in the related patents titled Financial Modeling and Counseling System, attorney docket number AND1P755 and Automated Coaching for a Financial Modeling and Counseling System, attorney docket number AND1P760, and A User Interface For a Financial Modeling System, attorney docket number AND1P759, all by the same inventors as the present invention, and all filed on the same day as the present application, and all of which are herein incorporated by reference.

Alternatively, the user may by pass the LifePath model and start with the portfolio modeling tool **182**. The availability of the portfolio modeling tool is based on the user's

service level agreement **161**. The user would supply his financial portfolio information to the financial advising system **102**, either directly using the user terminal **110** or indirectly through the wide area network **104**, by accessing a multiplicity of databases **166**, **168** and **170** and accessing information such as his securities portfolio at a particular brokerage firm. The financial portfolio modeling tool **182**, is an interactive tool that has access to the all the information available to the Lifepath model **162**, such as the user's life intentions data **166**, the user's external financial data **168**, as well as external market data **170**. User insight data **167** and aggregated data from the Lifepath model **165** is also available to the portfolio modeling tool. As a result the user has little to input and may start using the portfolio model **182** very quickly without the need to do a lot of tedious data input. The financial portfolio modeling also allows the user to access a computer coach and/or a live advisor based in part on the service level agreement.

An alternative embodiment allows the user to go through the LifePath model **164** and set his long term financial goals and then using the portfolio modeling tool **182** the user would adjust his investment portfolio to better achieve his long term financial goals.

Advice generating subsystem **172** comprises one or more advice or coaching engines **174**. Coaching engine **174** dynamically analyzes the financial needs of the user in accordance with the user's service level agreement. Furthermore, the coaching engine **174** is configured to operate with rules repository **176**. Rules repository **176** is a collection of rules-based business logic that produces clear automated advice. Rules repository **176** generates its advice using LifePath data **165** and user insight data **167**.

Alternatively the investment portfolio data from the portfolio modeling tool **182** triggers the coaching engines advise. In one embodiment of the invention, user insight data **167** includes transaction history, product or purchase history, as well as demographic information about the user.

In addition to providing sound coaching to the user, advice generating subsystem **172** also recommends product solutions to the user. As an example, in one embodiment of the present invention, the coaching engine **174** can recommend that the user include deposit products and loan products in their financial plan. For example, the coaching engine **174** can recommend that the user acquire a certain mortgage or bridge financing. Similarly, the coaching engine **174** can also direct the user to the need for financial products such as, home improvement, line of credit, or credit card products. Coaching engine **174** can also have access to product information from various financial institutions (not shown). Accordingly, the user can request additional information about the various products recommended by the system.

The user can access their financial plan or life path model using user terminal **110**. User terminal **110** is part of collaborative computing environment **178** and is in data communication with virtual coach **180** and the advisor terminal **106** through communications network **104**. In one embodiment of the present invention, communication network **104** is the Internet.

The advice and product solutions generated by the advice generating subsystem **172** are presented to the user through virtual coach **180**. Virtual coach **180** presents the product recommendation with accompanying rationale. The user may or may not wish to contact the dedicated financial advisor for additional advice or information. Because the system generates reasoned financial coaching in accordance with the user's financial needs and intentions, the financial advisor is able to operate more productively. Furthermore, the user can test different scenarios by altering the data captured by life path model **164**. Each scenario can then be analyzed by coaching engine **174**. The virtual coach **180** is further described in the related U.S. application named Automated Coaching System, attorney docket number AND1P760, by the same inventors, filed on the same day as the present application and incorporated herein by reference In addition to virtual coach **180**, the user can optionally interact with a dedicated financial advisor **106** through communications network **104**.

In one embodiment of the present invention, financial advisor **106** is located in a call center **118** on a relationship manager's workstation **125**. Financial advisor **106** can interact with user **110** using various multimedia interaction tools, for example, still-shot images or video streaming. Accordingly, the user is able to buttress the coaching received from virtual coach **180** with advice from a dedicated financial advisor operating at terminal **106**. In many situations, the live advisor's input may be necessary, since he brings a level of expertise and experience no automated coaching system may match. However, since the automated coaching has framed the problem for the user and the live

advisor, both can immediately start analyzing alternative solutions in a focused and more cost efficient fashion.

Depending on the level of service the user has negotiated with the service level agreement **161**, he may have a multiplicity of modeling tools available in the financial management system. In alternative embodiments of the present invention, modeling tools for analyzing various financial instruments such as bonds, reverse mortgages, option contracts and a like may be available to the user.

Figure **5** is an exemplary graphical user interface **196** that embodies the various concepts and methods set forth for financial portfolio modeling. As shown, the graphical user interface **196** includes a plurality of fundamental selection icons **198** including a my page icon **200** for displaying a graphical user interface specifically tailored for a particular user, a save icon **202** for saving any changes made to the graphical user interface **196**, an export icon **208** for exporting data displayed by the graphical user interface **196**, a print icon **210** for printing various fields of the graphical user interface **196**, a help icon **212** for obtaining help information, and an exit icon **214** for exiting the graphical user interface **196**.

My page icon **200** displays a web page that can be customized to each user's need, simplifying the use of the portfolio model **182**. In one embodiment of the present invention, the portfolio modeling system uses the Open File Exchange (OFX) protocol which has become the standard protocol for the exchange of financial information over a

wide area network, and particularly the Internet. Thus exported data from the portfolio modeling system into other financial programs is formatted to be easily usable by these programs.

Further displayed on the graphical user interface **196** is a plurality of mode icons **216** for initiating various modes of operation. The mode icons **216** include a transact icon **218** for initiating transactions involving the purchasing and selling of investments utilizing a network, a monitor icon **220** for monitoring the performance of the investments, a model icon **222** for generating an investment model based on criteria entered by the user, an explore icon **224** for retrieving information on the investments, and a track icon **226** for tracking the investments utilizing the network. In the preferred embodiment of the present invention, the Wide Area Network **104** is the Internet and the portfolio modeling system has access to outside databases such as Reuters and Bloomberg for historical and current securities pricing or market indexes.

With continuing reference to Figure **5**, a communication medium **228** may be employed to converse with other users, namely financial advisers, etc. Such communication medium **228** includes a window **230**, and a plurality of communications icons **232** that enable various types of communication between the user and the live coach or advisor. Such communications icons **232** include an e-mail icon, a chat icon, a voice icon, a talk icon, a clips icon, and a video icon. The mail server **116** and call center **118** allow the user to contact the advisor by email or telephone call. The mail server further supports live chat and voice over the network as well as a collaborative medium

such as a White Board™. Depending on the bandwidth available to the user, he may receive still pictures or live streaming video of the advisor, or he may see an animation.

The incorporation of the various communication technologies and programs within the context of a financial advising system is further described in a related application titled Communication Interface for a Financial Modeling and Counseling System, attorney docket number AND1P757, by the same inventors as the present application, filed on the same day, and incorporated herein by reference. Also, the graphical user interface of figure **5** is further described in the U.S. related application by the same inventors, titled A User Interface for a Financial Modeling System, attorney docket number AND1P759, both filed on the same day as the present invention and both herein incorporated by reference.

A filtering field **234** is also shown in Figure **5**. Such filtering field **234** includes a plurality of companies and associated risk levels and industries which are displayed in accordance with the user's appropriate tolerance to risk and investment style. A risk/reward map **236** is also shown displaying the probability of the user reaching its financial goals. Also shown is a coaching window **238** for displaying coaching strings **240** based on a rule-based automated coaching engine. Such window **238** may include a field adjustment bar **242** in order to facilitate viewing of the coaching strings **240**.

Further features associated with the graphical user interface for the portfolio modeling **182** include an information window **244** which illustrates various charts

pertaining to sector diversification and other investment parameters. A portfolio model window **246** may also be displayed for portfolio modeling purposes. It should be noted that the various services provided by the present invention might be initiated by selecting corresponding service icons **248**. The optimize icon **247** optimizes a securities list based on the newly specified criteria. The criteria icon **249** enables the user to introduce additional criteria for selecting a particular security. The trade list **251** displays the system recommended securities that should be sold based on the user criteria and his personal financial parameters. The filter icon **253** generates a filtered list of securities displayed in the filtered list window **234**. Sort icon **261** sorts the list of securities based on a user selected criteria such as alphabetical order. The coaching icon **259** generates context sensitive coaching related to the user's financial portfolio. The undo icon **257** undoes a specific swap of securities. The submit icon **255** submits and the user changes to his portfolio during the current session.

Further, a profile may be viewed and adjusted using a plurality of profile icons **250**. This ease of use helps the user to feel comfortable with the system and trusting of it, allowing him to take full advantage of the all the integrated features of the system.

The user can set a target goal for his investment portfolio as well as his preferences by selecting the target and preference icon **252**. He may do an analysis on his past or present portfolio by selecting the portfolio analysis icon **254**. He may trigger specific coaching on specific a security or group of securities or even on whole industry sectors, as well as request more detail information by selecting the stock analyst icon **256.** He may further model and analyze the effect of inclusion or exclusion of particular

securities on his portfolio by swapping stocks in and out of the portfolio **258**. When selecting a particular icon corresponding to the various tools, a corresponding help text string appears in the help screen **260**, directing the user on how to use the particular tool.

Figure **6** illustrates an investment portfolio management method utilizing a coaching engine in a network based financial framework. First, in operation **261**, a plurality of parameters is set for a subject utilizing a network. The parameters include personal investment parameters **262**, personal financial parameters **264**, and/or asset mix parameters **266**. Such parameters may include a minimum retirement, target floor, investment rate, tax implications, etc. In operation, the parameters may be selected manually by the subject using a desired graphic user interface, or by a third party.

Next, the network is utilized to provide the subject coaching from an investment coaching engine in operations **268**, where such coaching relates to the setting of the parameters. The coaching may be provided by utilizing a look-up table which is capable of generating various combinations of advice based on the settings. In the alternative, the advice may be generated using any other type of artificial intelligence system.

At least one financial model for a portfolio of the subject is subsequently generated in operation **270** based on the setting of the parameters. This may be generated using a system similar to that which generates the coaching, or any other desired means. The network is again used to provide coaching from the investment coach engine to the subject with the coaching relating to the generated financial model.

As shown in Figure **6**, the personal investment parameters include a risk tolerance parameter **272**. Further, the coaching by the coaching engine **274** may provide a textual risk tolerance profile for the subject based upon an interpretation of current risk tolerance parameters of the subject as textual analysis.

Further, the personal investment parameters may include an investment style parameter **276**. In such embodiment, the coaching by the coaching engine **278** provides a textual investment style profile for the subject based upon an interpretation of current investing style parameters of the subject as textual analysis.

Furthermore, in yet another embodiment of the present invention, the personal investment parameters include a bull/bear attitude parameter **270**. In the present embodiment, coaching by the related coaching engine **272** provides a textual description of an implied future of financial markets and graphs showing forecast curves of financial markets based upon the building of financial market forecasts which are, in turn, based upon evaluations from financial experts.

In one embodiment, the coaching by the coaching engine **274** relating to the setting of the personal financial parameters in operation **262** provides an alert if the investment parameters of the subject conflict with Lifepath cash flows or personal parameters based on a consistency check of the investment parameters with data obtained from a Lifepath model and personal investment parameters.

With continuing reference to Figure **6**, the coaching by the coaching engine **288** relating to the setting of the asset mix parameters in operation **290** provides a rationalization of the asset mix based on personal and financial parameters of the subject and at least one computer generated asset mix. No penny stocks would be included if the subject is conservative, only treasury bills. A pie chart may also be included that represents a portfolio showing the subject's assets.

In still another embodiment, the financial model comprises a model of an existing investment portfolio of the subject. Note operation **292**. The coaching by the coaching engine **294** provides an analysis of market-related growth by security and sector, trend analysis, fee and service analysis, and/or dividend and interest impact based upon transaction history and current market values of the existing investment portfolio. The coaching by the coaching engine **294** may also provide an analysis of growth, risk and value of the existing investment portfolio based on market data and expert analyst opinion.

Still yet, the coaching by the coaching engine **294** may provide an evaluation of the existing investment portfolio relative to the personal and financial parameters of the subject based on a comparison of growth and volatility projected forecasts to the personal and financial parameters of the subject. It should be noted that similar capabilities may be provided using a model based on a computer generated portfolio in operation **296**.

In operation **298**, the financial model may include a model of an investment portfolio of the subject generated by the subject with the input of a private banker. Coaching by the coaching engine **300** provides an analysis of growth, risk and value of each security in the investment portfolio based on a concatenated, user-friendly English format of market data and expert analyst opinion obtained utilizing the network **104**.

Further, the coaching by the coaching engine **300** may provide an evaluation of the contributions of securities in the investment portfolio relative to the personal and financial parameters of the subject based on a comparison of the personal and financial parameters of the subject to an analysis of risk compliance, growth, and volatility.

The first wave of customers of online discount brokerage customers have been characterized by sophisticated investment knowledge and confidence in acting as integrators of their own financial lives. They have established their own balance between risk and reward. Most of today's typical investors, typically know relatively little about the technicalities of investing.

In one embodiment of the present invention, a financial risk management system may include traditional fundamental/technical data and analyst interpretation. Much of this is meaningless to the average investor however. The present invention's approach meets their information and learning requirements in these ways. First it develops detailed profiles of the user's investment personality and customizes all information such as coaching to the user profile. Second the system uses coaching engines to translate

fundamental and technical data into natural language textual coaching string outputs, customized to the user. Furthermore, the financial modeling and counseling system alerts the user to investment activities which are incompliant with his personal investment parameters such as his risk tolerance, investment style and so on ... The financial modeling and counseling system further provides automated coaching throughout the investment process.

Risk tolerance, investment style and financial outlook are established through a series of interactive multimedia- based scenarios which unfold online. These exercises provide immediate coaching feedback to the user. The results are stored as a multidimensional profile which is used by modeling and coaching activities throughout the portfolio management process.

Figure **7** is a flow diagram illustrating the set risk tolerance operation **232** in greater detail. The user starts **302** this process by selecting the profile icon **250**. The user is prompted for the security type to be used for risk profiling **304**. Next, a negative financial scenario is presented to the user and he is asked if he wants to bail out once confronted with this negative scenario **306**. The negative scenarios presented to the user are generated by the coaching engine **274** and may include scenarios such as negative news related to a particular security and the company's future growth or performance and profitability. Faced with this situation, the user may decide to hold on to the particular security or sell and bail out. In one embodiment of the present invention the representations may include both textual and graphical representation, and may further

include headline news indirectly related to the particular company. Alternatively, the scenario generated may encompass as whole sector or industry such as the interest sensitive construction industry. Both indirect economic news such as a forecast of future interest rate and direct economic news such as declining housing starts or sales of new homes are presented to the user and his reaction to the negative news is indicative of his personal risk tolerance. If the user selects to bail out **308** based on the negative financial scenario, his risk tolerance profile is adjusted accordingly **310**. If the user refuses to bail out, he is confronted with an iteratively more negative market scenarios **306** scenario and again he has the option to again bail out **308**. Depending on when the user selects to bail out **308**, the system adjusts the user risk profile for that security type **310**. The process is repeated for other types of investment such as Retirement, Tax deferred environment.

The user reaches the end **312** of this process after the system has determined his risk tolerance for each investment type. Alternatively, the user's risk tolerance level can be set manually by a third person such as the live advisor or even possibly by the user himself. The average unsophisticated user does not know about his risk tolerance level.

The present invention provides risk management and reporting capabilities for personal investment portfolios of stocks and bonds. The present invention allows customers to be able to quantify the risk associated with their equity holdings for the first time. Currently risk management for personal portfolios is based on judgment and gut feel. The brokerage industry is currently facing a number of challenges and opportunities related to this. Too many optimistic self-directed investors are assuming levels of risk

they are not aware of and cannot afford. As well, regulators are concerned about the lack of controls in the trading environment potentially resulting in widespread losses and liability litigation.

Currently, risk management is a vague area which advisors and clients typically address using judgment and intuition. Advisors and brokerage firms need to quantify risk to mitigate legal liability. In addition, investors want to quantify the impact of individual picks on their portfolio risk/reward. Further, regulators will be supportive of processes that help investors to become more knowledgeable about risk and avoid unaffordable losses. Finally, the brokerage industry needs to outsource risk management services to avoid any additional technology problems and to ensure third party objectivity. Many investors build their own spreadsheets to understand their portfolio performance. The present invention provides new tools to benchmark portfolio performance and set a new industry standard for reporting and analysis.

Figure **8** illustrates a flow diagram for determining an investment style in a network-based financial framework. The present technique is intended to not just ask questions, but provide scenarios. It sets up a portfolio of stocks that an investor can trade or not trade on these fictitious stocks, and provides examples of how the stock market can move. The present method develops a profile and helps target information effectively for the particular person. Coaching is strategically designed to keep the risk minimal by avoiding telling what someone should do. Scenarios will also identify areas of weakness in one's knowledge.

In one embodiment, the interactive input exercise may include top down or bottom up test scenarios **314**, trading frequency test scenarios **316**, needs for information and research test scenarios **318**, level of expertise test scenarios **320**, and/or strategic or pragmatic test scenarios **382**. For example, a bottom up investor would start with a vision of the economy and decide what to invest in, and then they would look at one stock at a time and make a decision. Trading frequency is used by the system to project the user's portfolio performance in the future by taking into account trading cost. Level of expertise scenarios may be used to customize coaching strings and the level of explanation put forth by the automated coaching.

In use, an investment profile of the subject is generated based on the at least one interactive input exercise in operation **324**. Coaching is also provided for the subject based on the generated investment profile. A display may be generated for the subject based on the generated investment profile. Note operation **326**. In one embodiment of the present invention, the user may reject his investment style parameter as presented to him by the automated coaching and go through the process **276** to reset his investment style parameter.

Figure **9** illustrates a flow diagram for the "set Bull/Bear attitude" in operation **280**. The instant aspect of the present invention is able to come to a conclusion about a person. For example, it may determine how confident a person is about the future.

Online polling is one technique that allows the present invention to become the basis of a customer's long-term parameters. It achieves a systematic attempt to capture one's perspective on the economy as a whole. First, an expert is selected utilizing a network in operation **328**.

Next, an opinion from the expert is rendered utilizing the network and witnessed in operation **330**. At least one evaluation of the expert's opinion is then received from a subject utilizing the network. Note operation **332**. As an option, the step of obtaining the evaluation may be accomplished by displaying to the subject a plurality of choices for expressing the subject's agreement with the opinion of the expert, receiving a selection of one of the choices from the subject utilizing the network, and storing the selection. In one aspect of the present invention, the plurality of choices displayed to the user may include the following: strongly agree with the opinion, agree with the opinion, neutral to the opinion, disagree with the opinion, and/or strongly disagree with the opinion.

In operation **334**, the subject may be permitted to select at least one other expert utilizing the network after which operations **328-332** of the present invention may be repeated. The evaluation(s) may then be aggregated from one or more subjects, as indicated in operation **336**.

Thereafter, in operation **338**, at least one financial model is built based on the aggregated evaluation from the subject. As an option, the financial model may be selected from a model based on the future of a financial index, a model based on an

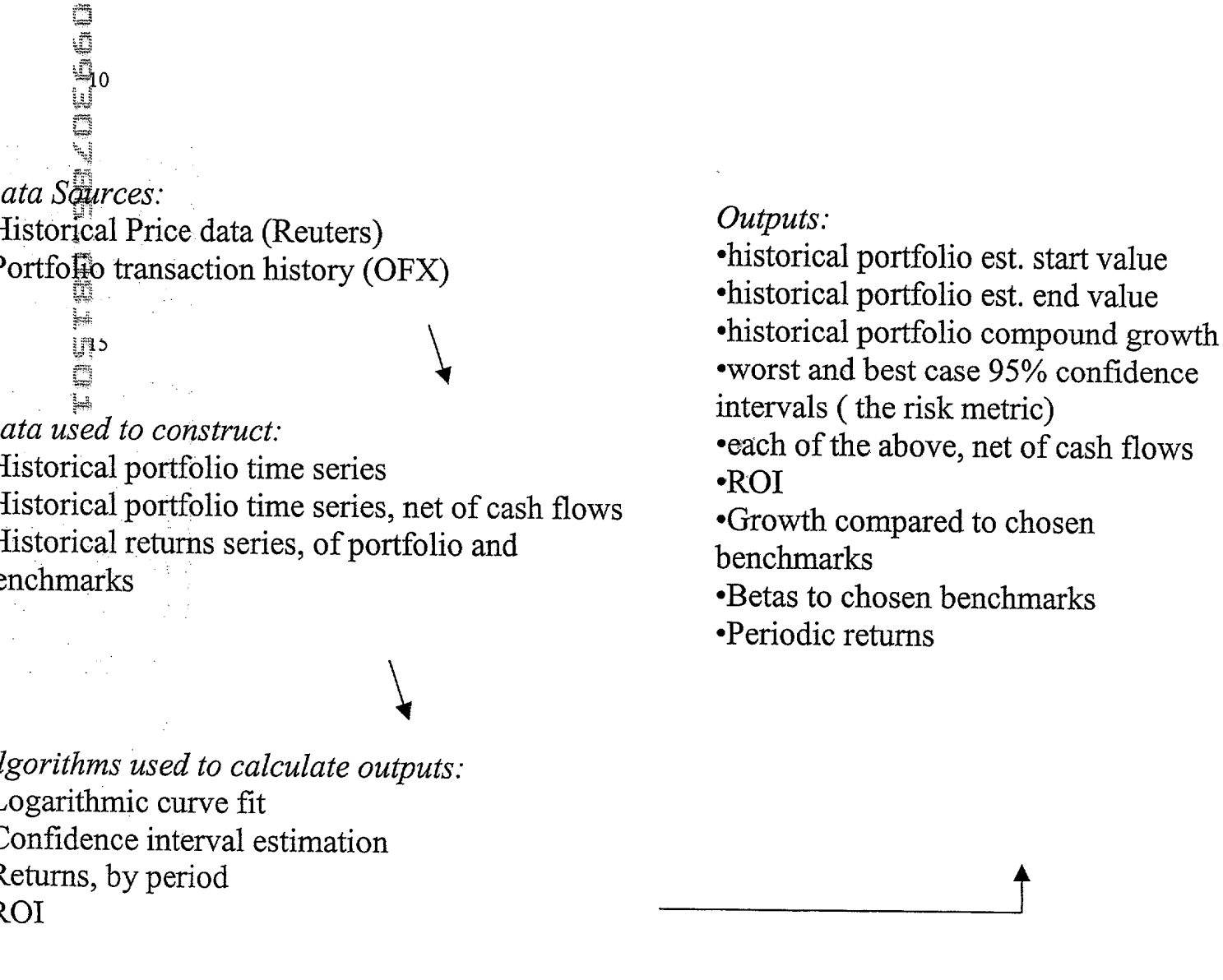
interest rate curve, and a model based on a gross domestic product (GDP). Further, the financial model is displayed in operation **340** utilizing the network. In one aspect of the present invention, the subject may be coached utilizing the network. See operation **342**. Such coaching may be based on the financial model.

Once personal investment parameters have been identified, the user is prompted to input some basic personal financial parameters **264**. Unlike the Personal Investment Parameters, which are largely qualitative, the Personal Financial Parameters are quantitative. They may include, initial and target values of the portfolio, the user's investment time frame, and whether the portfolio is a tax exempt IRA, 401K or Canadian RRSP

One important datum is the "floor." In a retirement portfolio this would be the bare minimum acceptable lifestyle the customer would be prepared to accept. The risk model used for analysis projects the portfolio value forward compounded at its current rate of growth. Surrounding the forecast line there are risk bands showing best and worst case scenarios given the aggregated volatility of all contained securities. The bands are preferably defined for example, by Bell curve theory and represent a sigma value related to the confidence level the customer requires in the forecast. The greater the confidence required, the wider the bands. If the "floor' value ends up within the bands, the customer is at risk of an unacceptable retirement. The customer can settle for less confidence in the portfolio projection. He may also optimize a portfolio that hits the target with lower risk using the automated coaching to guide him. He may further accept a lower target at

lower risk and rebalance his portfolio. He may simply lower his "floor" or decide to increase his contribution. Once the user's personal investment parameters and user's personal financial parameters have been established, the system sets the asset mix **266**.

The following data model shows the data sources and how the data is being used within the system.



The present invention uses an interactive model where various data sources are accessed through a wide area network such as the internet and the user does not have to feed to the system as much data manually. In an embodiment of the present invention, the risk modeling system may access external data sources supplying data for some of the risk/reward calculations in risk management system such as historical security pricing data from a source like Reuters, historical transaction data from the customer's brokerage, manual input by the customer, and some other file type, e.g. Quicken™ and MS Money™. Reuters data includes time series updated to Close from the previous day, adjusted for stock splits, comma delimited flat files, or other format of choice relating to up to 500 million stocks, bonds, mutual funds, derivatives ,etc. These files are formatted in OFX, the Open File Exchange format, now the accepted Internet standard which is the same format used by Quicken™, MS Money™, etc.

Figure **10** illustrates a flow diagram for modeling an existing financial portfolio **292**. First, the performance of at least one investment of a subject is determined utilizing a network. As shown, the performance of the investment includes obtaining a transaction history of the investment in operation **344**, obtaining a current market value for the investment in operation **346**, and analyzing the performance of the investment based on

the transaction history and the current market value of the investment. Note operation **348**.

Next, financial information is obtained relating to the investment of the subject. The step of obtaining the financial information relating to the investment may include obtaining historical data on the investment in operation **350**, and obtaining research relating to the historical data of the investment in operation **352**.

With continuing reference to Figure **10**, the aggregated growth and volatility of the investment is calculated in operation **354**. Such calculation may be performed based on bell curves, and other statistical techniques. Best case and worst case scenarios may also be produced.

A projection to a target date is subsequently built for the investment. Note operation **356**. This is done based on the determined performance of the investment, the financial information relating to the investment, and/or the calculated aggregated grown and volatility of the investment. Finally, displays are generated based on the built projection. Note operation **358**.

As shown in Figure **10**, coaching and a report **360** may be provided to the subject utilizing the network based on the determined performance of the investment. Further, coaching may be provided to the subject utilizing the network based on the obtained financial information relating to the investment. Note operation **362**. Such network may

also be used to provide coaching in operation **364** with the generated displays relative to personal and financial parameters of the subject.

Figure **11** is a flowchart illustrating a method for automated portfolio generation **296** utilizing a network. Three powerful portfolio tools use the personal and financial profile parameters as inputs. A tool may be used to create a customized portfolio automatically. It may create an ideal proportional breakdown of security types based on the customer's personal and financial investment parameters. Having created a set of filters, it may then select appropriate securities of each type at the right level of risk and volatility, validate the aggregated growth and volatility, and iterate if necessary. This risk modeling tool may be used by the user or by the live advisor to on the customer's behalf. The risk modeling sub-system allows to automatically analyze an existing portfolio, or to swap stocks in and out of the portfolio with automated coaching or the live advisor's help.

First, in operation **272,276 & 280**, financial information is received from a subject utilizing a network. In one embodiment of the present invention, the financial information of the subject includes personal investment parameters and/or financial parameters of the subject.

Filters are then generated based on the received information of the subject in operation **366**. Thereafter, historical data is obtained on investments utilizing the network. Note operation **368**. The historical data on investments is then filtered in operation **370** with the generated filters. Using the filtered data, a financial portfolio may

then be generated for the subject in operation **372**. Further, the filtered data may be weighted by an asset mix and/or risk tolerance of the subject.

In operation **374** shown in Figure **12**, aggregated growth and volatility may be calculated based on the built financial portfolio. Further, it may be determined whether the aggregated growth and volatility match the financial information of the subject. Note operation **376**. When it is determined in decision **378** that the aggregated growth and volatility fail to match the financial information of the subject, the filters may be adjusted. Such filters are adjusted until the aggregated growth and volatility match the financial information of the subject. Finally, in operation **380**, displays are generated based on the built financial portfolio.

Figure **15** illustrates a flow diagram of the process to rebalance a portfolio **298** with the aid of the automated coaching. In the first step the modeling system creates a portfolio model using either an existing portfolio or starts with a computer generated portfolio **382**. Next the user selects security from the list of filtered securities for possible "swap" or exchange with securities already in the portfolio **384**. The securities are filtered based on the user's personal investment parameters **262** and the user personal financial parameters **264**. For example, securities with higher Value At Risk coefficient than the permissible user risk tolerance are rejected. Securities are selected from user preferred industry sectors such as electronics or transportation. The system obtains historical data, technical and fundamental data, and research and breaking news or expert opinion, all pertaining to the particular security **386**. The coaching engine converts the data into natural language, non technical coaching strings **390**. Automated coaching

provides analyses of the technical and fundamental data and provides growth, risk and value analysis for each security selected **388**.

After the automated coaching output, the user may elect to do a "trial swap" of the security and observe the impact of the swap **392**. The modeling system recalculates the portfolio model including the added securities and the subtracted securities. The system further does a risk compliance to meet the with the user's personal investment profile **394**. Furthermore, the new portfolio's growth and volatility are analyzed by the system and the automated coaching engine translates the effect of the swap on the portfolio performance in non technical natural language **396**. If the user is satisfied with the resulting swap he may accept it **398**. If he is unsatisfied with the security swap, he may reject it **400**. In one embodiment of the present invention, the user may place an order to purchase the particular security through the financial modeling system, using the network.

The portfolio generation tools can be used to model and analyze a past or present portfolio. Most investment questions are addressed by analyzing the performance of the investor portfolio and using sophisticated analysis tools. Table 1 below illustrates an exemplary historical portfolio analysis in accordance with one embodiment of the present invention.

Investor's Basic Issues	System Calculates	Comments
How can I get a snapshot of my portfolio growth?	Growth curve with graphical display	The graphic shows the mean estimated initial value of the portfolio, the mean estimated final value and the growth curve connecting them
What was my portfolio worth at the *beginning* of the period?	Starting mean estimated portfolio valuation	Portfolio fluctuations make it hard to distinguish signal from noise. The growth curve runs right down the central axis of the volatility movements. Its end points represent estimated mean initial and current values
What was my portfolio worth at the *end* of the period?	Ending mean estimated portfolio valuation	(See above)
What kind of growth have I been achieving with my current investment strategy?	Compound growth factor	Current strategy includes choice of securities as well as timing and volume of investment. Historical growth factor includes growth due to both market changes and investor capital flows. It is calculated as a gross geometric average percentage change per period
Is there some way of measuring my risk exposure?	Value at Risk	"On average, you have been exposed to a 5% chance of losing $8000 on any given trading day." Computation to use variance/covariance method in a historical simulation
How do I know whether this level of risk is high or low?	VaR compare to VaR of user selected benchmark indexes and/or securities	
How does my portfolio reflect changes in the market?	Beta relative to chosen benchmarks	"Your portfolio tends to track strongly in the same direction as the NASDAQ 500, but its upward and downward movements are more extreme. You have recently tracked in a direction opposite to the DOW."
Which of the securities in my portfolio are the strong contributors to overall growth?	Net present contribution of each security to current growth	A list of strong and weak performers: a breakout of securities by compound growth
How does each security contribute to overall risk?	Beta analysis of equities and mutual funds relative to portfolio. Equivalent analysis for bonds	"Stock X is quite volatile, but tends to move in a direction opposite to the rest of your portfolio. For this reason, it tends to reduce overall risk."
What is my return on investment?	ROI: ♦ Based on gross cumulative investment ♦ Compared to equivalent cash flows into riskless Gov't. Bonds ♦ Net yield compared to riskless bonds	In a historical portfolio investors can find it hard to discriminate between the performance of the underlying securities and the impact of moving moneys in and out. This analysis calculates growth net of investment flows. It compares portfolio growth to the net present value of the cash flows at the beginning of the period in question. They are also compared to equivalent flows into a riskless bond. And the difference between actual and riskless gains is calculated. This allows calculation of the risk premium
How are the different sectors of my portfolio contributing to growth and risk?	Yield and volatility breakdown by sector	
What is my tax exposure?	Capital gains and other taxable exposure	

Table 1

In another embodiment of the current invention, the financial risk management system performs a risk/reward analysis of a current financial portfolio. Table 2 below illustrates an exemplary current portfolio analysis in accordance with one embodiment of the present invention.

Investor's Basic Issues	System Calculates	Comments
How can I get a snapshot of my portfolio growth?	Back test current portfolio over required period. Develop compound growth coefficient	Growth curve would be calculated, but not displayed. It would be used to develop the compound growth factor as well as the estimated current mean valuation
What is my portfolio worth now?	Ending mean estimated portfolio valuation	(See above)
Is there some way of measuring my risk exposure?	Value at Risk (VaR)	"On average, you are now been exposed to a 5% chance of losing $8000 on any given trading day." Computation to use variance/covariance method in a back-tested historical simulation of current positions
How do I know whether this level of risk is high or low?	VaR compare to VaR of user selected benchmark indexes and/or securities	
How does my portfolio reflect changes in the market?	Beta relative to chosen benchmarks	"Your portfolio may trend to track strongly in the same direction as the NASDAQ 500, but its upward and downward movements are more extreme. You may track in a direction opposite to the DOW."
Which of the securities in my portfolio are the strong contributors to overall growth?	Net present contribution of each security to current growth	A list of strong and weak performers: a breakout of securities by compound growth
How does each security contribute to overall risk?	Beta analysis of equities and mutual funds relative to portfolio. Equivalent analysis for bonds	"Stock X is quite volatile, but tends to move in a direction opposite to the rest of your portfolio. For this reason, it tends to reduce overall risk."
How are the different sectors of my portfolio contributing to growth and risk?	Yield and volatility breakdown by sector	
How does my historical portfolio performance compare to expected performance of my current portfolio?	Comparison and contrast of volatility compound growth, etc., variously broken down	

Table 2

The present invention provides risk management and reporting capabilities for personal investment portfolios of stocks and bonds. The present invention allows customers to be able to quantify the risk associated with their equity holdings for the first time.

Most investors do not understand the likelihood of reaching their investment goals, and what picks they should be making to increase their chances of success. Clients want to understand both historical performance and possible future performance in order to improve decision-making. The present invention can address both, with or without advisor support, allowing the business to meet the aggressive growth expectations the market values highly.

Many investors build their own spreadsheets to understand their portfolio performance. The present invention provides new tools to benchmark portfolio performance and set a new industry standard for reporting and analysis.

Preferably, the present invention is available 24 hours a day, seven days a week and requires no human intervention. Moreover, the present invention can inform clients about risk using plain language and simple graphic representations. This broadens the target audience to include all investors.

In one embodiment of the present invention, the historical positions of the investments of the user are retrieved from a database. In another embodiment, the historical analysis of the investments includes a calculation of a mean at endpoints of the historical analysis.

In one aspect of the present invention, capital gains taxable exposure may be determined based on the historical analysis. Optionally, a compound growth factor may be determined based on the historical analysis. Also optionally, a Value at Risk may be determined based on the historical analysis utilizing a variance method computation. The Value at Risk may also be determined based on the historical analysis utilizing a covariance method computation.

Figure **13** is a flowchart illustrating a method for performing risk and reward analysis in accordance with one possible embodiment of the present invention. First, in operation **402** a historical portfolio analysis of a user portfolio is performed. Then, in operation **404**, a current portfolio analysis of the user portfolio is executed. An impact of a current trade on the user portfolio is then determined using the current portfolio analysis as indicated in operation **406**. Finally, the user portfolio is forecasted and stress tested utilizing the historical portfolio analysis. See operation **408**.

An efficient portfolio can deliver a required level of growth for the least possible risk. Two ways to achieve this are to rebalance a portfolio to favor lower risk stocks which deliver appropriate growth, if they exist. Another is to favor securities with

appropriate growth whose volatilities move typically in opposite directions to the portfolio.

To manage risk in this way, the present invention provides the investor with two needed capabilities: a filter to identify candidate securities, and a tool to quantify the risk/reward impact of a given security transaction on the portfolio.

Trade impact analysis is conducted when the user swaps at least one security for another and the model recalculates the impact of the swap on the various indices. In one embodiment of the present invention, the selected securities characteristics include a growth coefficient. Optionally, the selected securities characteristics may include a correlation to selected indexes to overall portfolio. Also optionally, the selected securities characteristics may include a ratio of sigma to mean portfolio valuation.

In one aspect of the present invention, the selected portfolio characteristics may include portfolio growth. Additionally, the selected portfolio characteristics may include Value at Risk. Further, the selected portfolio characteristics may include a Beta. Table 3 below illustrates an exemplary current trade impact analysis in accordance with one embodiment of the present invention.

Investor's Basic Issues	System Calculates	Comments
How will a change in my positions impact risk and reward?	Growth, VaR and volatility impact of each proposed trade, both absolute and relative to user-selected benchmarks	Once the starting portfolio has been aggregated, it can be treated as a single security. The proposed trade, therefore, entails a simple, two-element variance/covariance analysis
How do I know which securities to use for a desired risk/reward impact?	System filters list of securities based factors including: 1. positive Beta to portfolio (increased risk) 2. negative Beta (decreased risk) 3. compound growth coefficient	Modern Portfolio Theory emphasizes that two volatile stocks within a portfolio can offset each other's volatility if they typically move in opposite directions. This hedging strategy has been difficult for retail investors. This will be the first commercial filter to emphasize not just the magnitude of a security's Beta but its direction compared to the Beta of the portfolio

Table 3

In another embodiment of the present invention, the forecast and stress analysis is generated by projecting a current position forward using a compound growth factor. Optionally, the forecast and stress analysis may be generated by projecting a current value of the current positions forward using a volatility from a historical portfolio analysis. Also optionally, the forecast and stress analysis may be generated by applying

compound growth and volatility using back-tested parameters to determine a future portfolio value.

In one aspect of the present invention, the forecast and stress analysis is generated by representing growth as an annuity with regular contributions to determine a further portfolio value. Additionally, a future portfolio value when future markets are different from past markets may be determined.

Given the current value, growth factor and standard deviation of the current portfolio, it is possible to project a value for any time in the reasonable near future. This can be presented graphically and alphanumerically. However, this is only valid assuming that both underlying market conditions and business performance of public firms do not significantly change.

There are two ways to couch this forecast in a more realistic perspective: use the Algorithmics' Mark-to-Future calculations to test against detailed scenarios and regimes using Monte Carlo Simulation and values from the "Cube." Pick a few of the bearish scenarios currently considered by analysts: emergent inflation, divergence of old and new economies, etc., and model their impacts in selected stress tests. Table 4 below illustrates an exemplary forecasting and stress testing analysis in accordance with one embodiment of the present invention.

What will my portfolio be worth if I continue my current pattern of investment activities?	System [illegible]ects current value of portfoli[illegible] [illegible]rward using the compound growth factor and volatility from historical portfolio analysis. It also calculates best and worst case using 95% confidence intervals.	The investor's histori[illegible] [illegible]attern of activities include: 1. Timing and selection of trades 2. Frequency of trades 3. Rate of investment into the portfolio 4. Performance of selected securities in the market 5. Cost of trades Growth and volatility calculations for the historical portfolio will be impacted by all of these. So the forecast based on history will test the performance of the entire combination of factors
What would my portfolio be worth if I: **1. let it alone** **2. grew it evenly by a regular monthly amount**	These projection would be based on back-tested parameters of the current portfolio. This would filter out the effect of: 1. Trading frequency 2. Cost of trades 3. Capital inflows/outflows The first question is answered by applying compound growth and volatility using the back-tested parameters. The second is answered by treating growth as an annuity with regular contributions	Many investors achieve less than optimal results by over-trading. They buy high and sell low, reacting to the morning news on impulse. They also lower their profitability through bloated trading costs. These two calculations allows the investor to compare the previous forecasts which include their trading practices to the current forecasts which do not. The second forecast treats their current portfolio as if it were a mutual fund in which they were dollar cost averaging.
What if future markets are different from the past?	Stress-test calculations could model some simple scenarios which would affect the entire portfolio: 1. One or more serious corrections at random times during the forecast interval 2. Long-term declines in overall compound growth 3. Combinations of the above The scenarios could be based on the fears and concerns that are current in the market at any given moment. For example, current fears include: 1. An inflationary cycle of unknown duration 2. A long-term divergence of old and new economy stocks 3. A collapse of over-valued Internet stocks 4. Etc. If Algorithmics methodologies were available, this is where a Mark-to-Future model would be useful	Most investment advisors are reluctant to provide forecasts based on historical growth for well-known reasons. Each of the forecasts in the rows above assume the future will unfold like the past. These stress tests are designed to create the appropriate sense of caution in the investor's mind.

Table 4

Figure **14** is an exemplary graphical user interface that embodies the many systems and methods set forth in a risk management and modeling system. As shown, the graphical user interface **412** includes a display icon where the user's portfolio is graphically compared to some user selected market indices on a risk /return graph **416**. Various user selected market indices are also shown simultaneously on the same graph, making a comparison simple and intuitive. A graphical risk representation of the user's portfolio and market indices are also displayed as a bar graph **418**. The user portfolio's return is compared in a bar graph format as well **420**. Time **422** is represented in a liner form in the lower portion of the graphical user interface. Further displayed on the graphical user interface **412** is a plurality of mode icons for initiating various modes of operation. By selecting the icon " How Have I Done?" **424**, a graphical representation of the user's past performance as compared to the market is calculated and displayed. Similarly, selection of " How will I do?" icon **428**, will result in the display of a projection of the user's portfolio as compared to the rest of the market. Another icon "What should I do" **426** would display the result of user making some security swapping to better conform the user's portfolio to the user's profile. Selection of "customize icon" **430** would allow the user to change the market indices displayed on the various graphs. The "coaching" icon **432** would trigger interactive coaching by displaying related coaching strings **434** in the coaching window **436**. The user selects to display all or part of his portfolio by using the selection icons **438**.

It is not easy to determine how well a portfolio has performed. Typically, investors compare the closing valuation of one period against a previous period, say, one year or one quarter. So often investors may believe that they are up 60% over the previous year. However, this is seriously misleading. If, for example, the end of the end period value reflects a temporary upswing and the start period value represents a brief downturn, the overall growth pattern can be dramatically overestimated.

There are many better approaches to portfolio valuation and marginal accuracy is typically gained by increased computational complexity. However, a simple, robust approach is to fit an exponential growth curve to the data. It is intuitively obvious that the curve passes through the 'center' of the data. This makes it easy for the investor to interpret the curve as the 'signal' that underlies the 'noise.' The two end points of the plot are reasonable proxies for mean portfolio values at each point in time. The compound growth factor in the curve is a good proxy for realized compound growth. The calculation algorithm is simple and uncontroversial.

The investor need not understand any of the math or the theory. This should be completely invisible. The simple idea is that the security or portfolio in question is likely to over- or under-perform the risk bands about 1 time in 20. For any moment in time, the investor can be shown that there has been 1 chance in 20 of portfolio gains being greater than X or losses greater than Y.

The three lines representing central tendency and upper/lower confidence intervals are easy to understand and interpret on the fly. Absolute risk can be measured by expressing standard deviation as a fraction of the central tendency. This can easily be presented on a scale. Relative risk can be measured by comparing this statistic to similar ones for indexes like the DOW, S&P. etc.

In one embodiment of the present invention, the current positions of the investments of the user may be retrieved from a database. In another embodiment, the current analysis of the investments includes a calculation of a mean at endpoints of the current analysis. In yet a further embodiment, the current positions may be back tested over a predetermined time period.

In one aspect of the present invention, a Value at Risk may be determined based on the current analysis utilizing a variance method computation. Optionally, a Beta may be determined and compared relative to selected benchmarks for the current positions.

Figure **15** is another embodiment of the graphical user interface **412**. The graphical window **441** displays portfolio growth history over a user selected time period. The graphical representation may include or exclude user contributions and withdrawals by selecting the appropriate icon **440**. The actual movement of the user's portfolio is represented by the graph **443**. The graphical window **441** displays on the same graph the upside opportunity **442**, the estimated current value **444**, and the down side risk **444** and the estimated start value **447**. Compound growth is also indicated based on the

portfolio's past performance and user inputs **448**. Interactive coaching displays appropriate coaching strings **434** in the coaching window **436**.

The portfolio history is computed in the following manner:

The number of *units* of a security at time *t* is the difference between the sum of units bought and sum of units sold in all previous transactions

The *position* of a security is the number of units times the price at time *t*

The *portfolio value* at time *t* is the sum of all positions

The *portfolio history* is the time series of portfolio values for *t* = *start value* to *end value*

The history includes positive and negative growth due to:

–Changes in the values of securities

–In and outflows of capital

The portfolio history is:

–stored as a vector of values

-displayed as a line graph.

Most investors do not understand the likelihood of reaching their investment goals, and what picks they should be making to increase their chances of success. Clients want to understand both historical performance and possible future performance in order to improve decision-making. The present invention can address both, with or without advisor support, allowing the business to meet the aggressive growth expectations the market values highly.

The present invention helps to build a common language, metrics and tools to quantify risk so that the investing public can proactively manage it. The present invention provides a rigorous process for managing personal portfolio risk.

Preferably, the present invention is available 24 hours a day, seven days a week and requires no human intervention. Moreover, the present invention can inform clients about risk using plain language and simple graphic representations. This broadens the target audience to include all investors.

Of the various kinds of risk a private investor must face, market volatility is central. This can be measured in terms of the amount of fluctuation a security or portfolio exhibits around a measure of central tendency. Taking the growth curve as the central tendency, volatility risk can be characterized by the familiar two standard deviation bands **442** and **446** representing 95% of measured variation.

Figure **16** is yet another implementation of the graphical user interface **412**. In this representation, the graphical window **450** displays a projection of the performance of the user's portfolio. The forecast and stress analysis of the user portfolio is generated by one of three method:

1- the future value is generated by projecting a current value forward using a compound growth factor.

2- another possible projection can be made by projecting a current value of the current position using volatility from a historical portfolio analysis.

3- also optionally, the forecast and stress analysis may be generated by applying compound growth factor and volatility using back-tested parameters to determine a future portfolio value.

Of course any forecast is based on assuming that underlying market conditions remain the same. In one embodiment of the present invention, algorithms such as the one by Algorithimcs' Mark-to-Future™ is used in calculations to test against detailed scenarios and regimes using Monte Carlo Simulation ™.

The risk and return analysis is performed in the following manner:

The estimated start value of a portfolio at the beginning of a reporting cycle, the estimated end value and the compound growth factor for each period in the cycle are calculated by fitting a curve of the form Y=AB^X to the time series, where:

- Y = the portfolio value at time t
- A = the estimated start value of the portfolio
- B = 1 + the compound growth factor
- X = the time period, t, where t = 0 in the first period

The curve is fitting by performing linear regression on X and the natural logarithm of Y:

- Ln Y = Ln A + X * Ln B

95% confidence intervals, the risk measures, are calculated using the standard error of the predicted value of Ln Y

The estimated end value of the portfolio is calculated using the regression formula where X = the number or periods in the reporting cycle, less 1.

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The present invention is initiated by the client from the brokerage's Web site. However, many of the application components may reside on the client. The application may either be downloaded from the Web site or provided on a CD ROM. The client-side application of the present invention reaches out to the secure web site for required data feeds and possibly more complex computation. Historical customer data is stored on the client to avoid complex data storage issues on the server. Customers are offered a secure back-up capability to a third party's address. If a client wants to share information with

their advisor, historical account information is automatically uploaded to the advisor with the client's permission.

A preferred embodiment of the present invention is written using JAVA™, C, and the C++ language and utilizes object oriented programming methodology. Any other Object Oriented Programming (OOP), may be used to implement the current invention. Moreover, the invention may be practiced with other computer systems configurations such as hand-held devices, multiprocessor systems, microprocessor-based or programmable consumer electronics, network PC's, microcomputers, and mainframe computers. The invention also may be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communication network. In a distributed computing environment, computer programs may be located in both local and remote memory storage devices.

Although only a few embodiments of the present invention have been described in detail herein, it should be understood that the present invention might be embodied in many other specific forms without departing from the spirit or scope of the invention. Therefore, the present examples and embodiments are to be considered as illustrative and not restrictive, and the invention is not to be limited to the details given herein, but may be modified within the scope of the appended claims.